Microcavity Discharge (MCD) Thruster Basics and Design

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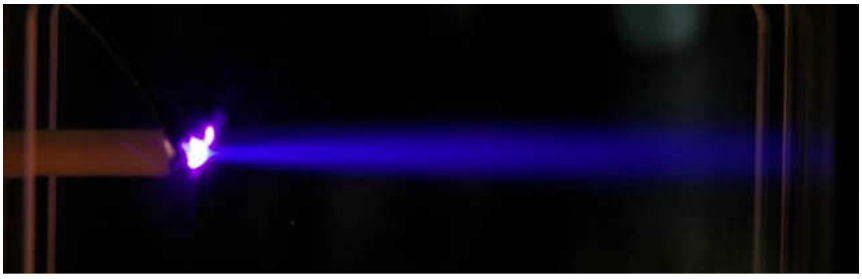
CU Aerospace is a world leader in the research and development of advanced electric propulsion system based upon microcavity discharge (MCD) technology. VACCO is the industry leader in Micro Propulsion Systems (MiPS) for CubeSats. The design of CubeSat propulsion systems are primarily driven by inherent envelope and power constraints. Cold gas solutions such as VACCO's MEPSI and Palomar MiPS are limited by the inherently low specific impulse of cold gas thrusters. Enhancing these systems with an MCD thruster increases total impulse by approximately 50% while remaining within envelope and power limits.

CU Aerospace, with University of Illinois participation, has been developing the MCD thruster into a robust and reliable thruster technology ideally suited for CubeSat propulsion. It consists of a micro Power Processing Unit (PPU) and the thruster itself. The MCD thruster uses radio frequency (RF) glow discharge to electro-thermally heat the propellant, with subsequent micronozzle expansion.

This paper will present MCD basics, a conceptual design for CubeSat implementation, and preliminary data. The basic MCD technology is TRL 3, but an operational design is rapidly advancing on a Propulsion Unit for CubeSats (PUC) program funded by AFRL.



MCD Thruster Hot-Fire Test using EP-13 propellant